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February 23, 2005, pursuant to RESPONSE AND AMENDMENT to non-final Office Action of July 2, 2004
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II. AMENDMENT TO THE CLAIMS

• Amendments Made Herein and Summary of Status of Claims

- Please amend claims 13-18, 31-34, 36 and 37, and cancel claims 1-12, 19-30 and 35, without prejudice. Please enter the new claims 38-43.

Claims 13-18, 31-34, and 36-43 exist after the amendment above is entered. No new matter was introduced with the amendment which is fully supported by the Specification.

• Statement with Respect to Scope of Amended and Non-Amended Claims

Revisions to the claim set is made in order to streamline prosecution of this case in order to obtain early allowance of embodiments that are presently anticipated to be of commercial significance and are not made for a purpose of patentability. Any amendment, cancellation, withdrawal or addition made herein with respect to the claims should not be construed in any manner as indicating Applicants' surrender of any subject matter of the application, or surrender of any equivalent to any element asserted in one or more claims. Any narrowing which may be evinced with respect to subject matter covered by the claims as a whole, or by one or more claims of the appended claims whether amended, re-represented, or new, when compared to claims previously in the application, should not be interpreted as indicating that the Applicants have generally disclaimed the territory between the original claimed subject matter and the amended claimed subject matter. Amended claims elements are to be construed to include substantial equivalents known to those of ordinary skill in the art. Applicants assert that any amendments transacted herein are made without prejudice and reserve all rights to prosecute any canceled claims, and claim structures preceding any amendment to a particular claim, and other disclosed (but not presently claimed) embodiments in the application, in future continuation applications, divisional applications, continuation-in-part applications, continuing prosecution applications, requests for continuing examination, re-examination applications and any other application claiming priority to the present application.

• COMPLETE LIST OF CLAIMS THAT ARE OR HAVE BEEN BEFORE THE OFFICE AFTER ENTRANCE OF THE AMENDMENTS MADE HEREIN

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The following claims constitute a complete list of claims that are or have been before the office after entrance of the amendments made herein. Amendments to the claims are indicated in accord with Revised 37 C.F.R. §1.121. In accord with such regulation, the listing of claims set forth below replaces all prior versions, and listings, of claims in the application:

--CLAIMS AS PENDING IN THE APPLICATION WITH AMENDMENTS MADE HEREIN
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1. - 12. (Canceled)

13. (CURRENTLY AMENDED) The method of claim 42 ~~38~~, wherein the step of creating ~~producing a rare cell image~~ mask signal further comprises: analyzing a histogram of luminance values of the color image signal representing the rare cell image; selecting for further processing, rare cell signal points having a luminance value above a last valley preceding a last peak of the histogram; and applying to the selected signal points a closing filter, ~~then~~ excluding areas not fitting a predetermined size criterion, and then applying a hole filling function, ~~producing the cell mask signal.~~

14. (CURRENTLY AMENDED) The method of claim ~~13~~ 12, wherein the step of creating a selected rare cell signal further comprises: ~~analyzing a histogram of saturation values of the cell mask signal;~~ selecting for further processing, signal points having a saturation value above a first valley following a first peak of the histogram; applying to the selected signal points a closing filter, ~~then~~ applying a hole filling function, ~~then~~ and excluding areas including a border of the image, ~~then~~ an erosion filter is applied, ~~then~~ and a thick filter is applied, producing the selected rare cell signal.

15. (CURRENTLY AMENDED) The method of claim ~~14~~ 42, wherein the step of creating a rare cell signal further comprises: selecting for the rare cell signal, signal points coinciding with the selected rare cell signal, ~~which includes among~~ a cluster of signal points lying within a predetermined size range, the cluster of signal points also having a hue value lying within a predetermined hue value range.

16. (CURRENTLY AMENDED) The method of claim ~~15~~ 44, further comprising: processing substantially only rare cell areas to generate a biologically identifying ~~significant~~ signal.

17. (CURRENTLY AMENDED) The method of claim 16, further comprising: acquiring an image of the body fluid or tissue smear; detecting in the acquired image the

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biologically identifying significant signal; and recording presence of the biologically identifying significant signal when coincident with a rare cell area from the rare cell data set or criteria.

18. (CURRENTLY AMENDED) The method of claim 16, further comprising: acquiring an image of a rare cell area of a body fluid or tissue smear, the rare cell area defined by the rare cell data set; and recording presence of the biologically identifying significant signal in the rare cell area.

19. - 30. (Canceled)

31. (CURRENTLY AMENDED) The product of claim 39, wherein the step of ~~producing~~ creating a rare cell mask color image signal further comprises: analyzing a histogram of luminance values of the color image signal representing the candidate blob; selecting for further processing, signal points having a luminance value above a last valley preceding a last peak of the histogram; and applying a closing filter to the selected signal points ~~a closing filter~~, then excluding areas not fitting a predetermined size criterion, then applying a hole filling function, producing the cell mask signal.

32. (CURRENTLY AMENDED) The product of claim 39 30, wherein the step of creating a selected rare cell image signal further comprises: analyzing a histogram of saturation values of the cell mask signal; selecting for further processing, signal points having a saturation value above a first valley following a first peak of the histogram; applying to the selected signal points a closing filter, then applying a hole filling function, then excluding areas including a border of the image, then an erosion filter is applied, then a thick filter is applied, producing the selected cell signal.

33. (CURRENTLY AMENDED) The product of claim ~~39~~ 30, wherein the step of producing ~~creating~~ a rare cell signal further comprises: selecting for the rare cell signal,

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signal points coinciding with the selected cell signal, which includes a cluster of signal points lying within a predetermined size range, the cluster of signal points also having a hue value lying within a predetermined hue value range.

34. (CURRENTLY AMENDED) The product of claim 39 29, the sequence of instructions further comprising ~~including~~ the step of: processing substantially only rare cell areas to generate a biologically identifying significant rare cell color image signal.

35. (Canceled)

36. (CURRENTLY AMENDED) The product of claim 39 34, the sequence of instructions further comprising ~~including~~ the steps of: acquiring an a color image of a rare cell area from among of a body fluid or tissue smear, the rare cell color image area defined by the rare cell data set; and recording presence of the biologically identifying significant signal in the rare cell area.

37. (CURRENTLY AMENDED) The method of claim 39 [[1]] wherein the body fluid is maternal blood and the rare cell is a fetal cell.

38. (NEW) A computer-controlled method for rare cell image identification, comprising

(i) digitally receiving a color image signal of an unenriched body fluid or tissue sample; and transforming the color image signal from a native color space represented by coordinate signals having values representing Red, Green and Blue (RGB) intensity to a processing color space represented by coordinate signals having values representing Hue, Luminance and Saturation (HLS) magnitude whereby a candidate blob may be readily identified by analyzing one coordinate signal thereof; and

(ii) forming the rare cell image color signal in the transformed color image signal of the candidate blob, wherein image characteristics to which predetermined selection criteria may be applied appear more prominently in one or more coordinate signals thereof; and

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(iii) producing a rare cell image mask signal and storing the mask signal in the computer memory, for eliminating from the candidate blob image signal those portions thereof not defining the rare cell.

39 (NEW) A computer software product comprising a computer-readable storage medium containing a sequence of computer directed steps to selectively identify a rare cell image, which comprise:

- (i) digitally receiving a rare cell color image signal in a candidate blob of an unenriched body fluid or tissue sample; and transforming the color image signal from a native color space represented by coordinate signals having values representing Red, Green and Blue (RGB) intensity to a processing color space represented by coordinate signals having values representing Hue, Luminance and Saturation (HLS) magnitude whereby the rare cell color image candidate blob may be readily identified by analyzing one coordinate signal thereof; and
- (ii) forming the rare cell image color signal in the transformed color image signal of the candidate blob, wherein image characteristics to which predetermined selection criteria may be applied appear more prominently in one or more coordinate signals thereof; and
- (iii) producing a rare cell image mask signal and storing the mask signal in the computer memory, for eliminating from the candidate blob image signal those portions thereof not defining the rare cell.

40. (NEW) The method of claim 38, wherein the digitized color image signal is derived through a computer-aligned plurality of microscope objectives from a large field sample.

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41. (NEW) The method of claim 38, wherein the rare cell is present at a concentration of 0.001%, 0.0001%, 0.00001%, or 0.000001%.

42. (NEW) The product of claim 39, wherein the digitized color image signal is derived through a computer-aligned plurality of microscope objectives from a large field sample.

43. (NEW) The product of claim 39, wherein the rare cell is present at a concentration of 0.001%, 0.0001%, 0.00001%, or 0.000001%.